length is necessary because after the guide wire has been advanced into position within the target coronary vein, the proximal portion of the guide wire projecting from the introduction point must be long enough to receive the lead. The guide wire is steered using a releasable or selectively lockable clamp 56 which, when loosened, can be slid along the main body 52 of the guide wire. Such a slidable, selectively lockable clamp is necessary because of the substantial length of the guide wire; the clamp is slid as required along the wire and locked in place at a position where it can be easily reached by the implanting physician during the implantation procedure.

In use, the guide wire 50 is inserted into the patient's vascular system utilizing an introducer. After the guide wire is properly placed, the introducer is removed, the clamp 56 is removed and the lead is then slid over the exposed part of the guide wire and advanced "over-the-wire" into the vessel. The clamp 56 is then slid back on the guide wire and tightened. These are awkward steps since the proximal extremity of the guide wire is typically a long distance from the introduction point. The flexible end 54 of the guide wire is maneuvered into the target vessel using the releasable clamp 56. After the lead is advanced over the wire into the vessel, and is in place therein, the guide wire is withdrawn. This, also, is an awkward maneuver given the length of the guide wire.

Summary of the Invention

In accordance with one aspect of the present invention, there is provided an implantable stimulation lead system, a preferred embodiment of which comprises a lead including a lead body dimensioned for placement inside the coronary sinus region. The lead body has at least one electrode positioned at a distal end of the lead body, the distal end of the lead body including a distal tip. The lead further includes a lumen extending the length of the lead and communicating with an aperture in the distal tip. The lead system further comprises a device dimensioned for insertion within the lumen, the device including a main body; a steering

knob secured to a proximal extremity of the main body; and a flexible distal portion secured to a distal extremity of the main body. The main body has a length such that, with the main body of the device substantially completely advanced within the lead, the flexible distal portion of the device projects distally from the aperture in the distal tip of the lead body.

Pursuant to other forms of the lead system of the invention, the main body of the device is formed of wire, and the flexible distal portion of the device comprises a wire coil.

In accordance with another exemplary form of the lead system of the invention, the flexible distal portion of the device comprises a proximal section and a distal section, the distal section being more flexible, and thus softer, than the proximal section. Still further, the proximal section and the distal section of the flexible distal portion of the device comprise wire coils.

Pursuant to another embodiment of the lead system of the invention, the said proximal and distal sections comprise a unitary structure. In one form of this embodiment, the proximal and distal sections are cylindrical in shape, with the proximal section having an outer diameter smaller than that of the main body and the distal section having an outer diameter smaller than that of the proximal section. In another form of this embodiment, the proximal section is cylindrical and has a diameter smaller than that of the main body, and the distal section comprises a thin leaf. Preferably, the thin leaf has a rectangular shape, with a width equal to the diameter of the proximal section. Further, the flexible distal portion of the device may include a wire coil surrounding the proximal and distal sections of the flexible distal portion. Further in this connection, the thin leaf includes a distal tip and the wire coil surrounding the proximal and distal sections of the flexible distal portion has an end attached to the distal tip of the thin leaf and another end attached to the distal extremity of the main body.

In accordance with another aspect of the present invention, there is provided a device for delivering a body implantable lead, a preferred embodiment of which device comprises a main wire body having a proximal extremity and a distal extremity; a steering knob secured to the proximal extremity of the main wire body; and a flexible distal portion having a proximal end secured to the distal extremity of the main body, the flexible distal portion comprising a wire coil. The wire coil forming the flexible distal portion of the device may include a proximal section and a distal section, the distal section being more flexible than the proximal section. Further, the proximal section and the distal section of the flexible distal portion of the device may comprise wire coils. Alternatively, the proximal and distal sections may comprise a unitary structure. In one form of this alternative, the proximal section is cylindrical and has a diameter smaller than that of the main body, and the distal section comprises a thin leaf. Still further, the thin leaf preferably has a rectangular shape with a width substantially the same as the diameter of the proximal section. Further yet, the flexible distal portion of the device preferably includes a wire coil surrounding the proximal and distal sections of the flexible distal portion. More specifically in this connection, the thin leaf includes a distal tip and the wire coil surrounding the proximal and distal sections of the flexible distal portion has one end attached to the distal tip of the thin leaf and another end attached to the proximal end of the flexible distal portion.

In accordance with yet another aspect of the invention, there is provided a method of implanting an electrode of an endocardial lead at an implantation site within a cardiac vein accessible via the superior vena cava (SVC), coronary os and the coronary sinus region, the lead including a distal portion and a lumen communicating with an aperture in a tip electrode, said implanting being effected using a device comprising a main body, a steering knob secured to a proximal extremity of the main body and a flexible distal portion affixed to and extending distally from a distal extremity of the main body, the method comprising the steps of